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IS 531 (1981): Lead brass strips for instrument parts  
[MTD 8: Copper and Copper Alloys]



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*Indian Standard*  
SPECIFICATION FOR  
LEADED BRASS STRIP FOR  
INSTRUMENT PARTS  
( *Second Revision* )

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BUREAU OF INDIAN STANDARDS  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

# Indian Standard

## SPECIFICATION FOR LEADED BRASS STRIP FOR INSTRUMENT PARTS ( *Second Revision* )

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# *Indian Standard*

## SPECIFICATION FOR LEADED BRASS STRIP FOR INSTRUMENT PARTS ( *Second Revision* )

### 0. FOREWORD

**0.1** This Indian Standard ( Second Revision ) was adopted by the Indian Standards Institution on 18 September 1981, after the draft finalized by the Copper and Copper Alloys Sectional Committee had been approved by the Structural and Metals Division Council.

**0.2** This standard was first published in 1959 and revised in 1971. It specified the requirements for leaded brass strip used in the manufacture of parts for instruments, such as clocks and watches and for parts of machine used for the purpose of blanking, drilling, mechanical engineering, etc.

**0.3** In this revision, the main modifications made are with respect to reference to IS : 3052-1974\* for dimensions and tolerances ( except tolerance on thickness of cold rolled strip ) which is an improvement over IS : 3052-1964, (a) clauses of straightness and (b) elongation percentage to be computed on 50 mm gauge length instead of  $4 \sqrt{\text{Area}}$ . The grade designation have also been altered.

**0.4** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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### 1. SCOPE

**1.1** This standard covers the requirements for three alloys of leaded brass strip used in the manufacture of parts for instruments.

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\*Dimensions for wrought copper and copper alloys, sheet, strip and foil ( for general engineering purposes ) ( *first revision* ).

†Rules for rounding off numerical values ( *revised* ).

## 2. TERMINOLOGY

**2.0** For the purpose of this standard, the following definition as given in IS : 3288 ( Part I )-1981\* shall apply.

**2.1 Strip** — Flat product, over 0.15 mm thick and up to and including 10 mm thick, of any width and generally not cut to length; usually in coil, but may be flat or folded.

## 3. SUPPLY OF MATERIAL

**3.1** General requirements relating to the supply of material shall be as laid down in IS : 1387-1967†.

## 4. CONDITION

**4.1** The material shall be supplied in one of the following conditions as specified by the purchaser:

- a) Half hard,
- b) Hard, and
- c) Extra hard.

**4.1.1** If required by the purchaser, the material shall be suitably stress relieved, in which case the material shall withstand the mercurous nitrate test specified in IS : 2305-1962‡.

## 5. CHEMICAL COMPOSITION

**5.1** The chemical composition of the material, when analysed in accordance with IS : 3685-1966§, shall be as given in Table 1.

## 6. MECHANICAL PROPERTIES ( INCLUDING PREPARATION OF TEST PIECES )

**6.1** Where both tensile and hardness properties are specified, they are to be regarded as alternative and the hardness shall be taken as mandatory unless otherwise agreed. Tensile and hardness tests shall be carried out in accordance with IS : 2654-1977|| and IS : 2866-1965¶ respectively. The following tests shall be made on test pieces selected as specified in 10 and the values obtained shall comply with the requirements given in Table 2.

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\*Glossary of terms for copper and copper alloys: Part I Cast form and wrought form ( main types ) ( *second revision* ).

†General requirements for the supply of metallurgical materials ( *first revision* ).

‡Method for mercurous nitrate test for copper and copper alloys.

§Methods for chemical analysis of brasses.

||Methods for tensile testing of copper and copper alloys ( *first revision* ).

¶Method for Vickers hardness test for copper and copper alloys.



**TABLE 1 CHEMICAL COMPOSITION OF LEADED BRASS STRIP**

( Clause 5.1 )

ALLOY DESIGNATION	PERCENT			
	Cu	Pb	Total Impurities* Max	Zn
(1)	(2)	(3)	(4)	(5)
CuZn39Pb2	58.0-60.0	1.5-2.5	0.3	Remainder
CuZn36Pb2	61.0-64.0	1.0-2.5	0.3	Remainder
CuZn35Pb1	63.0-66.0	0.75-1.5	0.3	Remainder

\*The specification limits do not preclude the possible presence of other unnamed elements. However, analysis shall regularly be made only for elements listed in the table except copper or zinc, either of which be treated as remainder. By agreement between the manufacturer and the purchaser, analysis may be required for establishing elements not specified.

**6.2** Whenever possible, tensile test shall be made on the full section of the material. Alternatively, a test piece of the full thickness of the material and machined to the dimensions of the 12.50 mm wide rectangular section test piece specified in IS : 2654-1977\*, with gauge length 50 mm, shall be used.

**TABLE 2 MECHANICAL PROPERTIES OF LEADED BRASS STRIP**

( FOR ALL ALLOYS )

( Clauses 6.1 and 6.2.3 )

CONDITION	TENSILE STRENGTH MPa Min	ELONGATION ON 50 mm GAUGE LENGTH PERCENT, Min	VICKERS HARDNESS	
			Min	Max
(1)	(2)	(3)	(4)	(5)
Half hard	375	10	110	140
Hard	510	5	140	165
Extra hard	570	—	165	—

NOTE — 1MPa = 0.102 kgf/mm<sup>2</sup>.

**6.2.1** The longitudinal axis of symmetry of the tensile test piece shall be in the direction of rolling.

**6.2.2** Tensile test shall not be applied to material 0.50 mm in thickness and less. The elongation percentage shall not be applied for strip thinner than 0.80 mm and less than 12.50 mm wide.

\*Methods for tensile testing of copper and copper alloys ( first revision ).

**6.2.3** The values obtained shall comply with the requirements given in Table 2.

**6.2.4** Materials of thickness 0.25 mm up to and including 0.50 mm, shall only be tested for and shall comply with the requirements of Vickers hardness.

**6.2.5** For material of thickness less than 0.25 mm, the condition of testing shall be as agreed to between the supplier and the manufacturer.

## 7. DIMENSIONS AND TOLERANCES

**7.1** The material shall be supplied by the manufacturer from the sizes specified in IS : 3052-1974\*.

**7.1.1** The tolerances, except tolerances on thickness of cold rolled strip shall be as given in IS : 3052-1974\*.

**7.1.2** The tolerances on thickness of cold-rolled strip shall be as given in Table 3.

**TABLE 3 TOLERANCES ON THICKNESS OF GOLD-ROLLED STRIP**

( All dimensions in millimetres )

SPECIFIED THICKNESS		TOLERANCES ( PLUS AND MINUS )			
Over	Up to and Including	Up to and Including 150 Wide	Over 150 up to and Including 300 wide	Over 300 up to and Including 450 wide	Over 450 up to and Including 600 wide
(1)	(2)	(3)	(4)	(5)	(6)
—	0.25	0.015	0.02	0.025	—
0.25	0.6	0.03	0.04	0.05	0.06
0.6	1.0	0.05	0.06	0.07	0.09
1.0	2.0	0.06	0.07	0.09	0.11
2.0	3.2	0.08	0.09	0.11	0.14
3.2	4.0	0.09	0.11	0.14	0.17
4.0	6.0	0.11	0.14	0.17	0.20
6.0	8.0	0.14	0.17	0.20	0.25
8.0	10.0	0.17	0.20	0.25	0.30

**7.2 Straightness** — Unless otherwise agreed to, the edges of the strip cut to length or strip in coil form shall not vary from a straight line in any 2 000 mm length, by more than the values shown in Table 4.

\*Dimensions for wrought copper and copper alloys, sheet, strip and foil ( for general engineering purposes ) ( *first revision* ).

**TABLE 4 STRAIGHTNESS TOLERANCES — MAXIMUM EDGE-WISE CURVATURE IN ANY 2000 mm PORTION OF THE LENGTH WITH ROLLED EDGES OR AS STRAIGHTENED**

( Clause 7.2 )

All dimensions in millimetres.

WIDTH	AS SLIT SUPPLIED IN COILS	SUPPLIED FLAT IN CUT LENGTH
15 and under	75	15
Over 15 up to 25	40	15
Over 25 up to 50	30	15
Over 50 up to 100	20	15
Over 100	15	15

## 8. MICROSCOPIC EXAMINATION

**8.1** The microstructure shall indicate uniform distribution of small particles of lead and beta phase wherever present.

## 9. FREEDOM FROM DEFECTS

**9.1** The material shall be reasonably flat, clean, smooth and free from harmful defects.

## 10. SAMPLING AND CRITERIA FOR CONFORMITY

**10.1** In any consignment, the strips of the same width and thickness and of the same temper and of the same grade in chemical composition and manufactured by a single firm, shall be grouped together to constitute a lot.

NOTE 1 — Strips ( cut to length ) and strip in coil form shall constitute separate lots.

NOTE 2 — The number of strips ( cut to length ) or strip in coils in each lot and the approximate masses of the material in the lot may be noted down which form the basis for the number of samples to be subjected to the various tests.

- From lot weighing less than 250 kg, one sample shall be taken to provide the necessary test pieces.
- From lot weighing 250 kg and not more than 1000 kg, the number of samples taken shall be in proportion of one per 250 kg of material submitted, any fractional remainder being considered as 250 kg.
- Where strip is supplied in coils weighing more than 250 kg, one sample shall be taken from each coil to provide the necessary test pieces.

- d) Lot exceeding 1 000 kg shall be arranged into batches of not less than 250 kg and not more than 1 000 kg to which the provision of (b) shall then apply. For strips cut to length the test samples shall, at the option of the purchaser, be obtained either by leaving, during manufacture, extra material of appropriate size upon a sufficient number of strips in the lot, or by taking them from the body of the strips at random. In the latter case the material from which test samples have been taken shall be accepted as good delivery, notwithstanding its consequent non-compliance with the ordered length or width, provided it is otherwise satisfactory.

## **11. RETESTS**

**11.1** Should any one of the test pieces first selected fail to pass the mechanical tests, two further samples from the same batch shall be selected for testing, one of which shall be from the strip from which the original test sample was taken, unless that strip has been withdrawn by the supplier.

**11.2** Should the test pieces from both these additional samples pass, the batch represented by the test sample shall be deemed to comply with this standard. Should the test pieces from either of these additional samples fail, the batch represented by the test samples shall be deemed not to comply with this standard.

## **12. MARKING**

**12.1** Each bundle, box or crate shall be marked with the alloys designation of the material, name of the manufacturer, mass and any other information required by the purchaser. Strip shall be suitably marked with the name of the manufacturer, alloy designation and temper of the material.

**12.1.1** The strip may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.



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